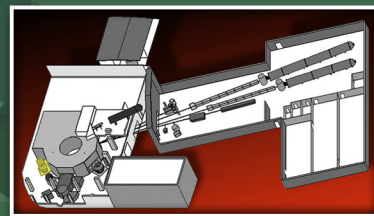


INSTRUMENT

HB-1

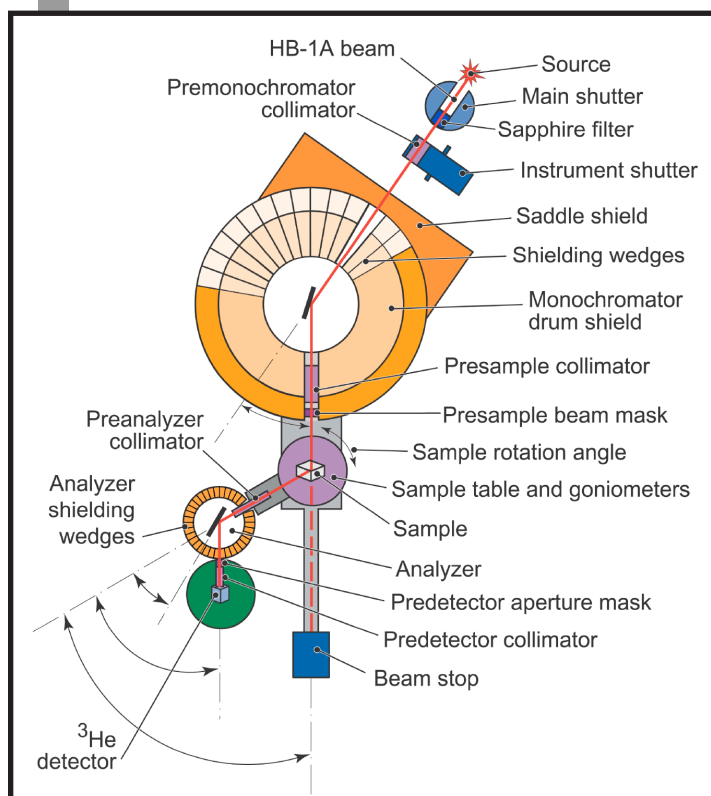
BEAM LINE

HIGH FLUX ISOTOPE REACTOR



POLARIZED TRIPLE-AXIS SPECTROMETER

The HB-1 Polarized Triple-Axis Spectrometer is designed primarily for the study of excitations in crystalline solids at intermediate energies. Thanks to the vertical beam focusing and the very high time-averaged flux at HFIR, its geometry is optimal for investigating small samples and weak scattering in specific areas of energy-momentum space. The sample goniometers and a full software implementation of the three-dimensional sample orientation matrix allow measurements outside the traditional single-scattering plane. The unique capability of HB-1 is the polarized configuration for studies of excitations, phase transitions, structures, and density distributions in magnetic materials. Use of a beryllium low-pass filter makes the instrument suitable for hypothermal neutron measurements with incident or final energy below 5 meV.



SPECIFICATIONS

| Beam spectrum | Thermal |
|----------------------|---|
| Monochromators | Unpolarized Vertical Focus PG(002) polarized commissioning |
| Analyzers | Unpolarized fixed vertical focus PG(002), Be(101), Si(111) Polarized Heusler (111)-commissioning |
| Monochromator angle | $2\Theta_M = 14$ to 75° |
| Sample angle | $\pm 180^\circ$ |
| Scattering angle | -90 to 120° |
| Analyzer angle | -40 to 140° |
| Collimations (FWHM) | Premonochromator: $15'$, $30'$, $48'$ Monochromator-sample: $20'$, $40'$, $60'$, $80'$ Sample-analyzer: $20'$, $40'$, $60'$, $80'$ Analyzer-detector: $20'$, $70'$, $90'$, $120'$, $210'$, $240'$ |
| Detector | Single ^3He gas counter |
| Resolution (elastic) | 5-10% Ei (adjustable with collimators) |

Status: Operational



May 2011

APPLICATIONS

The following are some of the scientific applications for which the Triple-Axis Spectrometer is particularly well suited.

- Spin waves in ordered magnetic materials
- Exotic excitations in low-dimensional, molecular, itinerate, and other "quantum" magnets
- Spin and lattice excitations in high- T_c superconductivity, colossal magnetoresistance materials, and multiferroic systems
- Spin density distributions in magnetic compounds
- Phonon dispersion curves in alloys and phonon-driven phase transitions

FOR MORE INFORMATION, CONTACT

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<http://neutrons.ornl.gov/instruments/HFIR/HB1/>